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EXAMINER

SUNDARAM, T R

ART UNIT	PAPER NUMBER
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2858

4

DATE MAILED: 04/09/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/725,646

Applicant(s)

Guanghua Huang et al.

Examiner

T. R. Sundaram

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Nov 29, 2000
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

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DETAILED ACTION

Priority

1. Applicant's claim for domestic priority under 35 U.S.C. 119(e) to application 60/221,550, filed July 28, 2000, is acknowledged.

Specification

2. The abstract is objected to for the following reason:

The abstract is more than 150 words long.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited.

Information Disclosure Statement

3. The listing of references in the specification is not a proper information disclosure 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) specifies that "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, the patent and commercial reference listed in lines 11-12, page 2 must be listed in a separate IDS submitted with the response to this Office Action. Unless the references have been cited by the examiner on form PTO-892, they have not been considered.

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Claim Objections

4. Claims 20-28 are objected to because of the following informalities: Claims 20-28 are objected to as being hybrid claims, which embrace or overlap **two different** statutory classes or categories of claims; see 35 U.S.C. 101, “which is drafted so as to set forth the statutory classes of invention in the **alternative only**”; emphasis added, MPEP § 2173.05 (p).

For example, claim 20 recites a “method of manufacture” in the preamble, but includes a testing step in line 7. Similarly, claims 21 and 22, which depend on claim 20, recite testing steps. Claim 24, which also depends on claim 20, appears to be an apparatus claim. Similarly, claim 25 which recites a “method of manufacturing” in the preamble, recites method steps for testing and measuring (such as in line 7). Claims 26-28, which depend on claim 25, represent method claims for using an apparatus.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-9 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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7. Claim 1 recites the limitation "the electronic circuit" in line 7. There is insufficient antecedent basis for this limitation in the claim, since an electronic circuit has not been mentioned earlier in the claim. The recitation should be changed to "the device" or "an electronic circuit of said device," or some such consistent recitation.

Claims 2-9 inherit the indefiniteness of the parent.

8. Claim 7 is further rejected because it recites the limitation "the test head" in line 2. There is insufficient antecedent basis for this limitation in the claim, since a "test head" has neither been mentioned earlier in the claim, or in claim 1 on which claim 7 depends.

9. Claim 9 is further rejected, because it recites the limitation "the work surface" in line 2. There is insufficient antecedent basis for this limitation in the claim, since a "work surface" has neither been mentioned earlier in the claim, or in claim 1, on which claim 9 depends. The preamble of claim 9 also recites: "The test fixture of claim 1." No such test **fixture** is recited in claim 1; claim 1 recites a **probe**. Moreover, while a "work surface can be a part of a test fixture, it cannot be a part of a **probe**.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who

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has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

In light of the claim objections and indefiniteness rejections given above, the following art-based rejections are predicated on the best interpretation that the Examiner is able to assign to the claims.

11. Claims 1-6 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by *Taura et al.*

Regarding claim 1, *Taura et al.* discloses a test probe (100, Figs. 1A-C and 2) for a high-frequency device (120, Figs. 1C and 2) having two or more contact regions (113 and 118, Fig. 2), the test probe comprising: at least one signal probe tip (101) having a contact area for contacting one of the contact regions (113) of the device (120); and a ground probe (102 and 102A) having a ground contact surface substantially greater than the contact surface area of the signal probe tip (Fig. 1A; note that the signal probe tip, 101, is shown as a point, while the ground contacts, 102 and 102A are shown with finite widths) for contacting another one of the contact regions of the electronic circuit (Fig. 1C).

In the foregoing rejection, we have quoted the language of claim 1 *verbatim*, and have demonstrated how it **reads** on *Taura et al.*, even in terms of the well-known **prior art** disclosed therein. It is noteworthy that the same features are also contained in the different embodiments disclosed in *Taura et al.*, such as Figs. 5, 11 and 16A; 23A; 26A; and so on, albeit the latter have more complex geometry than the prior art probes shown in Figs. 1A-C and 2.

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Regarding claim 2, in *Taura et al.* it can be seen, especially clearly from Fig. 4A wherein the signal contact 101 has a circular cross-section and the ground contacts 102 have a rectangular cross-section, that the surface area of the latter is at least ten times greater than that of the former.

Regarding claim 3, in *Taura et al.* the ground contact comprises two noncontiguous regions (Figs. 1A and 1C).

Regarding claim 4, in *Taura et al.* the ground contact surface consists of a continuous contact surface (2 and 4, Fig. 6; and column 1, lines 63-65).

Regarding claim 5, in *Taura et al.* the ground probe has a non-contact surface (402 upper, Fig. 13A) substantially parallel to the contact surface (402 lower) for purposes of impedance matching (column 10, lines 43 ff).

Regarding claim 6, in *Taura et al.* the signal probe is connected to a coaxial connector (Fig. 2 and column 1, line 10); see also Figs. 16A and 16B.

Regarding claim 9, in *Taura et al.* the signal probe (103, Figs. 1B and 1C) defines a non-right angle with the contact surface (electrode 113) on the device under test (120).

12. Claim 14 is rejected under 35 U.S.C. 102(b) as being anticipated by *Logan*.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Logan discloses a test probe (Fig. 7) comprising: first and second signal probe tips (34, Fig. 4); and a single ground structure (30, Fig. 4; and column 6, lines 1-2) between the first and second probe tips (Fig. 4).

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Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Taura et al.*, in view of *Abe*.

Regarding claim 7, as demonstrated in section 10 above, *Taura et al.* discloses all of the structural elements in claim 1, on which claim 7 depends.

Taura et al. does not disclose, however, a DC contact region for receiving a DC bias input.

Contact regions for DC bias input are well-known and common-place in test probes, especially those designed for high-frequency applications, as exemplified by *Abe*.

Abe discloses a high-frequency probing apparatus with at least one DC contact region for receiving a DC bias input (7, Figs. 5(a) and 5(b); column 3, line 51; column 6, lines 31-35 and 41-44; column 8, lines 47-51; and column 9, lines 20-23).

Taura et al., *Abe* and the present invention are analogous art, all being concerned with high-frequency probes and/or test fixtures.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teachings of *Taura et al.*, and *Abe* and to have arrived at the invention of claim 7.

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The suggestion/motivation for doing so would have been that the use of DC bias in high-frequency applications has known advantages, and *Abe* expressly teaches these (column 3, lines 50-54).

Now, regarding claim 8, *Taura et al.* discloses all of the structural elements in claim 1, on which claim 8 depends.

Taura et al. does not expressly teach that the ground probe is removable, albeit, in an apparatus claim, making two or more parts separable (where in prior art the parts may have been integral), or conversely, making a part integral or of “unitary construction” (where in prior art a similar part may be separable and/or removable), does not make a claimed apparatus patentably distinct from the prior art apparatus (MPEP § 2144.04). For example, in *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965), the court upheld the rejection of a brake drum integral with a clamping means, whereas in the prior art device several parts were rigidly secured to form a single unit. The court affirmed “that the use of a one piece construction instead of the structure disclosed [in the prior art] would be merely a matter of obvious engineering choice.” In the converse case of making something separable, in *In re Dulberg* 289 F.2d 522 523, 129 USPQ 348, 349 (CCPA 1961), the court held that a lipstick holder with a removable cap was obvious over prior art, although the cap was “press fitted” and therefore not manually removable, since “if it were considered desirable for any reason to obtain access to the end of the [prior art] holder to which the cap is applied, it would be obvious to make the cap removable for that purpose.”

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Moreover, even if the Applicant's probe needle was somehow **adjustable** (rather than being merely "removable"), claim 8 would still not be patentably distinct over prior art. In *In re Stevens*, 212, F.2d 197, 101 USPQ 284 (CCPA 1954), the court held that **adjustability**, where needed, is **not** a patentable advance.

15. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Logan*, in view of *Taura et al.*

As already noted in section 11 above, *Logan* discloses all of the limitations in claim 14, on which claims 15 and 16 depend.

Logan does not disclose that the ground contact area is larger than the signal contact area (claim 15), or that the ground contact surface includes a non-contact surface parallel to and offset from the contact surface (claim 16).

Taura et al., however, discloses both of the two aforementioned features (respectively, Fig. 1A and Fig. 13A).

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teachings of *Logan* and *Taura et al.*, and to have arrived at the invention of claims 15 and 16.

The suggestion/motivation for doing so would have been that as expressly taught by *Taura et al.*, these features are important in proper impedance matching in high-frequency testing (column 2, lines 19 ff).

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16. Claims 10-13, 17-19, 20, 23 and 25-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Abe*, in view of *Taura et al.*, and *Itoyama*.

Regarding claim 10, *Abe* discloses a test system (Fig. 1) for testing two or more microwave devices (abstract, lines 2-3; and Fig. 10a, MMICs 2a), with each device (2a, Figs. 3 and 4) having at least one signal port (5a), at least one ground pad (5b), and at least one DC input-output pad (5, Fig. 5a and 5b), the system (Fig. 1) comprising: a work surface (stage 3, Fig. 2b) for supporting the two or more microwave devices (2a, Fig. 10a); a test head (4, Fig. 2a; and column 5, line 17) including: at least one signal probe tip (41a; column 5, line 17) having a contact surface area for contacting the one signal port (5a) of a first one of the microwave devices (Fig. 2a); and a first ground probe (41b) having ground contact surface area "substantially" greater than the contact surface area of the one signal probe tip (note that there are **two** ground probes tips and one signal tip) for contacting the one ground pad of the first one of microwave devices (2a); a means for sequentially moving the test head into alignment (column 3, lines 43-49; and column 6, lines 18-19) with each of the microwave devices (2a) on the work surface (3) and for bringing the signal probe tip (41a) into contact with the one signal port (5a) of each microwave device (2a) and the contact surface of the first ground probe (41b) into contact with the one ground pad (5b) of each microwave device (Figs. 1-4).

As alluded to in the foregoing paragraph (in which we have quoted the language of claim 10 *verbatim*, except for two exceptions which we shall presently address), *Abe* does not expressly disclose that the ground-probe contact area is substantially larger than the signal-probe contact

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area (albeit, as we noted, there are **two** ground probes tips and only one signal probe tip). Nor does *Abe* disclose a programmable means to automatically move and align the probe head; rather, it discloses manually operated micrometers (24, 25 and 26, Figs. 1 and 9; and column 1, lines 12-28) for X, Y and Z movement and alignment.

As already noted in connection with claim 1, *Taura et al.* discloses a microwave probe in which the ground contact tip (102 and 102A) has a surface area that is substantially greater than the contact surface area of the signal probe tip (Fig. 1A; note that the signal probe tip, 101, is shown as a **point**, while the **two** ground contacts, 102 and 102A are shown with **finite widths**).ground probe (102 and 102A) having a ground contact surface substantially greater than the contact surface area of the signal probe tip (Fig. 1A; note that the signal probe tip, 101, is shown as a point, while the ground contacts, 102 and 102A are shown with finite widths).

Automatically-operating and programmable test heads for moving, positioning and aligning the probe heads is also well-known and widely-used in semiconductor-device testing, as exemplified by *Itoyama*. *Itoyama* discloses a prober apparatus in which the test head (26, Fig. 5) is moved and aligned automatically (Figs. 5-15).

Abe, *Taura et al.*, and *Itoyama* are analogous art, all of them dealing with high-frequency testing of semiconductor devices.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teachings of *Abe*, *Taura et al.*, and *Itoyama*, and to have arrived at the invention of claim 10.

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The suggestion/motivation for doing so would have been that the matter of using the appropriate type of probe and test head, from what is available in the art, to fit a specific need is a matter of design choice and is not novel; MPEP § 2144.07 Indeed, the courts have held that the selection of a prior art reference based on its suitability for the intended use recited in a claim is *prima facie* obvious. In *Sinclair & Carroll Co. v Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) the court held that: "Reading a list and selecting [an apparatus] to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jigsaw puzzle."

Regarding claim 11, *Abe* discloses a DC biasing system (Fig. 5a; and column 6, lines 29-44); see also discussion on claim 7, above.

Regarding claim 12, removability is not a patentable feature; see discussion on claim 8, above.

Regarding claim 13, as already noted, in *Taura et al.* the signal probe (103, Figs. 1B and 1C) is at a non-right angle to the contact surface (electrode 113) on the device under test (120).

Claims 17-19 are method claims which describe the method of using the apparatus already considered under claims 10-13, and contain the same structural limitations as in the latter set of claims. Therefore, they are also obvious and unpatentable over *Abe*, in view of *Taura et al.*, and *Itoyama*.

Regarding claims 20, 23 and 25-28, these are hybrid method-of-manufacturing and method-of-using claims of the apparatus already considered in claims 10-13, and they recite

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essentially the same structural limitations as in claim 10-13. Regarding some of the other aspects mentioned in these claims, we note that the limitation "frequency greater than one Giga-hertz" (claim 27, line 3) is indeed the **definition** of a microwave. That is, by definition, microwaves have a frequency greater than about 1000 Mhz. *Abe* discloses a microwave probe (title). We also note that *Abe* indeed does disclose two (claims 25-28) separate test heads (4, Figs. 1-4).

Therefore, claims 20, 23, 25-28 are also obvious and unpatentable over *Abe*, in view of *Taura et al.*, and *Itoyama*.

Regarding claims 29-30, these method claims again essentially recite the same limitations as in the claims already considered. Both *Abe* and *Taura et al.* disclose the importance of impedance matching (respectively column 3, line 12 and column 2, line 25), and *Abe* is concerned with packaged devices as well (abstract and column 3, line 20). *Taura et al.* discloses the ground probe having a overhanging surface (402, Figs. 13A and 13C).

Therefore, claims 29-30 are also obvious and unpatentable over *Abe*, in view of *Taura et al.*, and *Itoyama*.

Regarding claims 31-33, these method claims recite the same limitations as in the method claims already considered, albeit in slightly different language. Therefore, they are also obvious and unpatentable over *Abe*, in view of *Taura et al.*, and *Itoyama*.

17. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Abe*, in view of *Taura et al.*, and *Itoyama*, as applied to claim 20 above, and further in view of *Logan*.

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As already described above *Abe*, *Taura et al.*, and *Itoyama* disclose all of the limitations in claim 20, on which claims 21 and 22 depend.

Abe, *Taura et al.*, and *Itoyama* do not expressly disclose specific signal frequency ranges or frequencies greater than 10 or 20 GHz, albeit *Abe*'s probe is a microwave **band** probing apparatus (title), which necessarily implies a **band** whose **lower** bound is one GHz.

Microstrip probes operating at 10 GHz or higher are, however, known in the art, as exemplified by *Logan*, which discloses a ceramic microstrip probe operating at 10 GHz (column 2, line 53).

Abe, *Taura et al.*, *Itoyama*, *Logan* and the present application are analogous art, all being concerned with testing of semiconductor devices at microwave frequencies.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teachings of *Abe*, *Taura et al.*, *Itoyama* and *Logan*, and to have arrived at the invention of claims 21 and 22.

The suggestion/motivation would have been, as already noted, choosing a prior art reference based on its suitability for the intended use recited in a claim is *prima facie* obvious; "no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle."

18. Claims 8, 12 and 32 are **further** rejected under 35 U.S.C. 103(a) as being unpatentable over *Taura et al.*, in view of *Abe*, *Itoyama*, *Gleason et al.*, *Matsunaga et al.*, and *Boyette, Jr. et al.*

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In our earlier rejections of the aforementioned claims (respectively pages 8, 12 and 13, above), we argued that although neither *Taura et al.*, nor *Abe*, disclose that the probe tips are removable (as recited in the subject claims), removability was by itself **not** a patentable feature.

Moreover, the fact of the matter also is that removable probe tips are taught in prior art microwave probes. Specifically, *Gleason et al.*, *Matsunaga et al.*, and *Boyette, Jr. et al.*, all teach detachable probe tips (respectively, Figs. 1, 6 and 2). *Matsunaga et al.* expressly teaches ground probe tips (that have a larger contact area than the signal probe tips; Figs. 10A and 21A, compare 15 and 13) that can be removed (Fig. 19).

Taura et al., *Abe*, *Itoyama*, *Gleason et al.*, *Matsunaga et al.*, *Boyette, Jr. et al.*, and the present invention are analogous art, all being concerned with high-frequency testing of semiconductor devices.

At the time of the invention, it would have been obvious for one of ordinary skill in the art to have combined the teachings of *Taura et al.*, *Abe*, *Itoyama*, *Gleason et al.*, *Matsunaga et al.*, and *Boyette, Jr. et al.*, and to have arrived at the invention of claims 8, 12 and 32.

The suggestion/motivation would have been that choosing is a well-known feature in the art to fit the specific needs of a situation is *prima facie* obvious (MPEP § 2144.07); “no more ingenious than selecting the last piece to put in the last opening in a jig-saw puzzle.”

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Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Godshalk et al. discloses a high-frequency probe tip assembly.

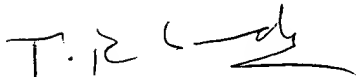
Burr et al. discloses a coaxial prober with tip shielding.

Boll et al. discloses a probe tip structure.

Okumichi discloses a high-frequency wave measurement substrate.

Nightingale et al. discloses a probe tip adapter.

20. Any inquiry concerning this communication should be directed to Dr. T. R. (Joe) Sundaram at telephone number (703) 308-6821. If attempts to reach the Examiner by phone are unsuccessful, the Examiner's supervisor, N. Le can be reached at (703) 308-0750.



T. R. Sundaram

April 4, 2002